

Rec'd PCT/PTO 27 DEC 2004
10/500378

Patent
Customer No.: 022870
Docket No.: 20605.014US

UNITED STATES PATENT AND TRADEMARK OFFICE
PCT DO/EO/US

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US Application No.:	10/500378	
IA Application No:	PCT/EP03/00047	
IA Filing Date:	01-07-2003	
Title:	DEVICE FOR PRODUCING CIGARETTE PACKS	

ENGLISH TRANSLATION OF PATENT COOPERATION TREATY (PCT)
INTERNATIONAL APPLICATION NO. PCT/EP03/00047

FOC-690-WO

06.01.2003/4112

DEVICE FOR PRODUCING CIGARETTE PACKS

Description

5 The invention relates to an apparatus for producing
packs with a blank wrapping an article which is to be
packaged, in particular a cuboidal cigarette pack with
an outer wrapper made of film, it being possible for
the blank of the outer wrapper to be folded around the
10 article or around the cigarette pack and for peripheral
folding tabs to be folded into a transversely directed
position by a fixed-location, movable folding element.

In the production of packs, it is usually the case that
15 a flexible-tube fold of the blank is produced first of
all. This means that the blank is positioned in
U-shaped manner on the article, and folded around the
latter, and the peripheral folding tabs projecting on
one side are folded to form a partial overlap. In the
20 case of cuboidal (cigarette) packs, inner blanks, paper
blanks (for soft-carton packs) and outer wrapper made
of film are folded in accordance with this principle.

The invention is concerned with folding blanks, in
25 particular in conjunction with a flexible-tube fold
being formed from the blank. The task, with a high
packaging-machine performance and thus short operating
cycles, is to provide as precise a fold as possible.

30 The object of the invention is thus to provide an
apparatus for folding blanks by means of which, along
with the high performance, the blank can be positioned
against the article which is to be wrapped, and folded
around the same, in a reliable and crease-free manner.

35 In order to achieve this object, according to the
invention, the folding element can be moved relative to

the article, or to the pack which is to be wrapped, while carrying along part of the blank in the direction of the free periphery or of the peripheral folding tab, with the blank being pressed against a surface of the
5 article or of the pack.

According to the invention, rather than the blank being folded in an operating cycle, the folding element is moved continuously, in particular rolled, along the
10 surface of the article, with the blank being pressed against the same and tensioned in the process, until the peripheral folding tab or flexible-tube tab is folded. Accordingly, the folding element is thus preferably designed as a folding roller which is
15 rolled, by way of a matching circumferential surface, along the facing surface of the article with the blank, the region of the blank being pressed against the same and tensioned in the process.

20 Furthermore, according to the invention, the folding roller is designed with more or less radially directed folding crosspieces or folding noses which, at the end of the rolling movement, fold over a peripheral tab or flexible-tube tab against a transversely directed
25 (side) surface of the article. The circumference of the folding roller - in a departure from a cylindrical shape - is designed such that it can roll from one periphery of the continuously moving article to the other periphery, with the flexible-tube tab finally
30 being folded.

The further features of the invention concern the configuration of the folding element. An exemplary embodiment of the apparatus according to the invention
35 is explained in more detail hereinbelow with reference to the drawings, in which:

figure 1 shows a schematic side view of part of a packing machine,

figure 2 shows, on a vastly enlarged scale, a sub-region of a folding turret of the packing machine in the region of a folding station,

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figures 3 and 4 show, on a further-enlarged scale, a detail of figure 2 in different folding phases, and

10 figure 5 shows a radially directed plan view of a folding element from figure 2.

The exemplary embodiment of the drawings is concerned with the production of cuboidal packs 10, namely
15 cigarette packs of the soft-carton type.

This type of pack serves for accommodating a cigarette group which, in the case of the present exemplary embodiment, is enclosed by a single-piece blank. The
20 pack 10 is completed by an outer wrapper made of film, namely by a blank 11 made of thin, transparent plastic film. The present exemplary embodiment is concerned with the folding and/or an important folding step for fitting the blank 11 of the outer wrapper.

25

The packing machine which is shown schematically in figure 1 comprises a pocket chain 12, for transporting cigarette groups which have been formed, a folding turret 13, a transfer turret 14 and a drying turret 15.
30 The cigarette groups, as pack contents, are transferred to the folding turret 13 from the pocket chain 12. This folding turret produces the pack 10 and transfers it to a transfer turret 14, which passes the packs 10 on to the drying turret 15 in order to stabilize glued
35 connections. The finished packs 10, finally, are transported away via a removal conveyor 16.

As is customary for a packer for soft packs, the folding turret 13 is provided with folding mandrels 17

along the circumference. These are thin-walled, elongate, rectangular hollow bodies. The pack contents, namely the cigarette group, are located within the folding mandrel 17. The blanks for forming the pack 10
5 are positioned one after the other on the outside of the folding mandrel 17 and folded thereon.

In the case of the exemplary embodiment shown, (paper) blanks for forming the pack 10 are positioned on the
10 folding mandrel 17 in the region of a first blank station 18. In a following, first folding station 19 this (paper) blank is folded around the folding mandrel 17, this being accompanied by the formation of a base wall comprising folding tabs. This is followed by a
15 second blank station 20, in the region of which the blanks 11 of film are fed to the folding turret 13 and/or the folding mandrels 17. The blank station 20 is designed such that the blanks 11 for the outer wrapper are each introduced into the movement paths of the
20 continuously circulating folding mandrels 17, that is to say in a more or less radially directed movement. The blank 11, which is held available transversely to the movement direction of the folding mandrel, is carried along by the folding mandrel 17 as a result of
25 the circulatory movement of the latter. The blank 11 here is positioned in a U-shaped manner around the folding mandrel 17 or around the (paper) blank already located on the folding mandrel 17.

30 The folding mandrels 17 are fitted on the folding turret 15 such that a first narrow side wall 21 is directed forward in the movement direction and a second side wall 22 is directed rearward in the movement direction. Furthermore, the folding mandrel 17 forms a
35 large-surface-area outer wall 23, which is directed radially outward, and a radially inner wall 24.

The available blank 11 is carried along by the front side wall 21 of the folding mandrel 17. A radially

outer folding leg 25 is positioned against the outer wall 23, and an inner folding leg 26 is positioned against the inner wall 24, of the folding mandrel 17. The dimensioning of the blank 11 results in
5 projections, namely a radially outer inner tab 27 and a radially inner outer tab 28, being formed in the region of the rear side wall 22. The two folding tabs 27, 28 are folded one after the other against the side wall 22 to form the flexible-tube fold (figure 4), the entire
10 inner tab 27 butting against the side wall 22, and the outer tab 28 partially overlapping the inner tab 27.

Once received by a folding mandrel 17, the blank 11 is fixed on the folding mandrel, to be precise by a
15 pressure-exerting roller 29, in the region of the front side wall 21. An inner tab 30 belonging to the base wall is already folded at the front in the region of the blank station 20.

20 The blank station 20 is formed in the top region of the folding turret, approximately in the region of an (imaginary) vertical center plane. Following the blank station 20, the folding mandrels 17 move in a downwardly directed movement path, in the form of an
25 arc of a circle, into the region of a second folding station 31. This is where the inner tab 27 and outer tab 28 are formed into the flexible-tube fold. Between the blank station 20 and folding station 31, fixed and arcuate outer and inner guides 32, 33 are positioned on
30 both sides of the folding mandrel 17 in order to keep the folding legs 25, 26 in the U-shaped folding position.

The folding station 31 has a folding element of
35 particular design, namely a folding roller 34. The latter is positioned at a fixed location on the outer circumference of the folding turret 13, adjacent to the movement path of the folding mandrel 17. The folding roller 34 is driven in rotation such that the region

which is directed toward the folding turret 13 in each case has the same direction of rotation as the folding turret 13 (arrows). The folding mandrels 17 are moved one after the other past the folding roller 34, a
5 circumferential surface of the folding roller 34 butting against the outer wall 23 of the folding mandrel 17 and/or of the blank 11 during the movement phase. With continuous movement of the folding mandrel 17 and of the folding roller 34, the latter rolls on
10 the outer wall 23. The folding roller 34 butts with linear or strip-like contact against the folding mandrel 17, to be precise beginning in the region of the front side wall 21 and continuing to the rear side wall 22. This continuous rolling movement has the
15 effect not just of positioning the blank 11 or its folding leg 25 against the folding mandrel 17 or the already folded blank. Rather, it also causes the blank 11 to be smoothed in the direction of the free periphery, namely in the direction of the inner tab 27.
20 The folding leg 25 is tensioned in abutment against the folding mandrel 17, with the formation of any creases being rolled out. At the end of the rolling movement, the inner tab 27 is folded into a transverse position with abutment against the side wall 22.
25
The folding roller 34 has a particularly configured contour or lateral surface. In the case of the present exemplary embodiment, four lateral portions 35 are formed one after the other along the circumference,
30 each for executing a folding cycle, with the result that four successive packs 10 are processed in the abovedescribed manner during a full revolution of the folding roller 34. A radially projecting folding crosspiece 36, which extends in the axis-parallel
35 direction, is formed between successive lateral portions 35. This folding crosspiece serves for folding over the inner tab 27 in each case at the end of a folding or rolling cycle.

The lateral portions 35 are designed to deviate (slightly) from a cylindrical surface, to be precise with account being taken of the kinematics during the rolling process on the facing surface of the pack 10 or of the folding mandrel 17. As can be seen from figure 2 in particular, the folding roller 34 or an approximately quarter-circle-shaped lateral portion 35 comes into abutment against the pack 10 or against the folding mandrel 17 by way of a region which is associated with the respective folding crosspiece 36. The rolling region of the lateral portion 35 is designed in the radial direction as a slight convexity 49, projecting slightly beyond the circular or cylindrical contour, whereas an upstream region of the lateral portion 35, as seen in the direction of rotation, is designed as a radial concavity 50.

The folding crosspieces 36 are also of particular configuration in cross section, that is to say they have a sharp-edged, rounded tapering in the direction of the radially outer end. A rounded chamfer 37 which adjoins the respective lateral portion 35 ensures a tensioning-maintaining folding movement of the inner tab 27 to follow the rolling operation of the lateral portion 35. The folding crosspiece 36 is radially dimensioned more or less to correspond to the width of the inner tab 27. In the end phase of the folding movement, the chamfer 37 is positioned in a form-fitting manner around a (rounded) edge of the folding mandrel 17 as the inner tab 27 is folded over.

In order to complete the flexible-tube fold, a further folding element becomes active in a temporarily coordinated manner. This folding element is a folding lever 38 with angled contour. Such a folding lever 38 is assigned to each folding mandrel 17, namely is fitted on the folding turret 13. The folding lever 38 is designed such that a more or less radially directed movement takes place in the end phase of the folding

operation (figure 2). In this case, an approximately circumferentially oriented supporting leg 39 comes into abutment against the radially inner side of the pack 10 or of the folding mandrel 17, namely against the folding leg 26 of the blank 11. A transversely or radially directed second supporting leg 40 grips the radially inner outer tab 28 and folds the latter, in time with the folding crosspiece 36, against the rear side wall 22 of the folding mandrel 17, the outer tab overlapping partially with the inner tab 27 (figure 4).

The folding tools, namely folding crosspieces 36, on the one hand, and folding lever 38 or supporting leg 40, on the other hand, are dimensioned, and coordinated with one another in respect of movement, such that overlapping does not take place even in the end phase. As can be seen from figure 4, the folding crosspiece 36 leaves the region on the rear side of the folding mandrel 17 while the supporting leg 40, on account of continued folding movement of the folding lever 38, completes the flexible-tube fold. The folding lever 38 or the supporting legs 39, 40 remains/remains in the folding position (figure 2) until the pack 10 is finished and leaves the folding turret 13.

The radially inner guide 33, in the form of a circle arc, interacts with the radially inner folding element - folding lever 38. The folding leg 26 of the blank 11 with outer tab 28 butts against this guide. The guide 33 thus terminates in the region of the folding station 31.

The guide 33, on the one hand, and the folding lever 38, on the other hand, are of comb-like design, and accordingly comprise a plurality of correspondingly shaped crosspieces (figure 5). These form, together, the guide 33 and/or the folding lever 38. The elements can be moved past one another on account of this comb-like design.

Interacting with the folding roller 34 is a co-running guide element by means of which the fold produced by the folding roller 34 is stabilized on the radially outer side. This guide element is an endless belt 41. The latter envelops the folding roller 34 over a relatively large circumferential region determined by a fixed-location, rotating supporting roller 42. A supporting strand 43 of the endless belt 41, the supporting strand moving in the direction of rotation of the folding turret 13, butts against the outside of the pack 10 or of the folding mandrels 17 following the folding roller 34. The endless belt 41 thus extends over a sub-region of the movement path of the folding mandrel 17 up to a deflecting roller 44.

As can be seen from figure 5, the endless belt 41 comprises a plurality of, namely three, individual belts which are guided in grooves 45 on the circumference of the folding roller 34. The latter, in turn, rather than being configured as a continuously cylindrical structure, comprises a plurality of cylindrical roller portions 46, 47, 48 which are mounted at intervals from one another on a common shaft. The roller portions 46..48 are assigned to different regions of the folding mandrel 17 or of the blank 11. It is also the case that the distribution of the individual belts for forming the endless belt 41, in the case of different axial dimensioning of the roller portions 46..48, is divided up to take account of the folding function.

The abovedescribed folding means, in particular folding roller 34, can also be used, with a folding rolling movement for creating crease-free regions of blanks, in the production of other types of pack.

List of designations

10	Pack	41	Endless belt
11	Blank	42	Supporting roller
12	Pocket chain	43	Supporting strand
13	Folding turret	44	Deflecting roller
14	Transfer turret	45	Groove
15	Drying turret	46	Roller portion
16	Removal conveyor	47	Roller portion
17	Folding mandrel	48	Roller portion
18	Blank station	49	Convexity
19	Folding station	50	Concavity
20	Blank station		
21	Side wall		
22	Side wall		
23	Outer wall		
24	Inner wall		
25	Folding leg		
26	Folding leg		
27	Inner tab		
28	Outer tab		
29	Pressure-exerting roller		
30	Inner tab		
31	Folding station		
32	Guide		
33	Guide		
34	Folding roller		
35	Lateral portion		
36	Folding crosspiece		
37	Chamfer		
38	Folding lever		
39	Supporting leg		
40	Supporting leg		